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PREFERRED FREQUENCIES FOR ACOUSTICAL MEASUREMENTS

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Indian Standard

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PREFERRED FREQUENCIES FOR ACOUSTICAL MEASUREMENTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 14 January 1963, after the draft finalized by the Acoustics Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 The variety of frequencies at present used for acoustical measurements makes comparison of results difficult. Some of these difficulties arise from the use of frequencies spaced at different intervals or of series starting from different frequencies. The object of this standard is, therefore, to recommend a single reference frequency and a single series of frequencies in such a way as to afford a maximum number of common frequencies in the various series. The resulting simplification would reduce to a minimum the number of frequencies at which acoustical measurements are to be made. Equipment may be specifically constructed for these frequencies, thus simplifying the design of equipment.

0.3 Since many kinds of measuring equipment are in current use, certain equipment may not conform to present standard; nor it is to be expected that existing equipment should be discarded. This standard, however, provides a guide to future design and construction of apparatus and to the selection of the various frequencies in an orderly fashion.

0.4 The frequency of 1 000 cycles has been accepted internationally as a standard frequency for acoustical measurements and has, therefore, been selected as the basic frequency for the series of preferred frequencies for acoustical measurements.

0.4.1 However, 400 c/s has been adopted as the standard audio frequency in the Indian Standards on loudspeakers and followed by the Indian industry of radio and acoustical equipment. Consequently, until the change-over to 1 000 c/s has been accomplished, 400 c/s also will continue to be specified as test audio frequency.

0.5 For certain kinds of acoustical measurements, it may be convenient to space the frequencies by fractions of octave, but for extension into the infrasonic and ultrasonic ranges, it is convenient to use powers of ten. These two requirements are strictly incompatible. However, it has proved possible, without inconvenience, to use the $10^{\frac{1}{10}}$ series for calculating the entries in Table I because of the fact that $2^{\frac{1}{3}}$ (= 1·259 9) is very nearly the same as $10^{\frac{1}{10}}$ (1·258 9), that is, ten successive intervals in the 1/3 octave series may be accepted as a sufficient approximation to the preferred frequency ratio of 10. Practical consideration may also make some additional rounding of frequency desirable, thus 500 c/s is listed instead of 501·187, which is the exact frequency determined by $10^{\frac{1}{10}}$ scale. The maximum individual deviation introduced is only 1·22 percent.

0.6 Generally a constant percentage increment of frequency is adopted and the test frequencies then form a geometric series. This standard recommends a geometric series and is not intended to apply when a constant frequency increment or other particular spacing would be more suitable.

0.7 This standard does not cover the frequencies for musical scales.

0.8 This standard is based on Draft ISO Recommendation No. 402 Preferred Frequencies for Acoustical Measurements issued by the International Organization for Standardization.

1. SCOPE

1.1 This standard lays down the preferred frequencies for acoustical measurements.

2. PREFERRED FREQUENCIES

2.1 The frequencies preferred for acoustical measurements are given in Table I. The degree of preference is indicated in the table.

2.1.1 The frequencies not covered in Table I may be derived by extending the series in either direction.

2.2 In case octave intervals are desired, the preferred frequencies are 500, 1 000, 2 000 c/s, etc, as indicated by the crosses in the octave column. If the intervals are 1/2 or 1/3 octave, the preferred frequencies are those indicated by crosses in the appropriate column.

3. RANGE OF APPLICATION

3.1 When electro-acoustic devices and equipment are to be designed and/or constructed, or when data are to be given at discrete frequencies, these discrete frequencies should be selected from Table I in accordance with the particular interval chosen.

3.2 In the case of filter pass bands, the frequencies listed in Table I shall be the geometric centre frequencies of the bands.

TABLE I PREFERRED FREQUENCIES FOR ACOUSTICAL MEASUREMENTS

Preferred Frequencies	1/1 Octave	1/2 Octave	1/3 Octave	Preferred Frequencies	1/1 Octave	1/2 Octave	1/3 Octave	Preferred Frequencies	1/1 Octave	1/2 Octave	1/3 Octave
16	×	×	×	*160*	—	—	×	*1 600*	—	—	×
18	—	—	—	180	—	×	—	1 800	—	—	—
20	—	—	×	*200*	—	—	×	**2 000**	×	×	×
22·4	—	×	—	224	—	—	—	2 240	—	—	—
25	—	—	×	**250**	×	×	×	*2 500*	—	—	×
28	—	—	—	280	—	—	—	2 800	—	×	—
31·5	×	×	×	*315*	—	—	×	*3 150*	—	—	×
35·5	—	—	—	355	—	×	—	3 550	—	—	—
40	—	—	×	*400*	—	—	×	**4 000**	×	×	×
45	—	×	—	450	—	—	—	4 500	—	—	×
50	—	—	×	**500**	×	×	×	*5 000*	—	—	×
56	—	—	—	560	—	—	—	5 600	—	×	—
63	×	×	×	*630*	—	—	×	6 300	—	—	×
71	—	—	—	710	—	×	—	7 100	—	—	—
80	—	—	×	*800*	—	—	×	**8 000**	×	×	×
90	—	×	—	900	—	—	—	9 000	—	—	—
100	—	—	×	**1 000**	×	×	×	*10 000*	—	—	×
112	—	—	—	1 120	—	—	—	11 200	—	×	—
125	×	×	×	*1 250*	—	—	×	*12 500*	—	—	×
140	—	—	—	1 400	—	×	—	14 000	—	—	—
160	—	—	×	*1 600*	—	—	×	**16 000**	×	×	×

NOTE — Values given in **Bold** type are first preference.
Values given in *Italic* type are second preference.
Values given in ordinary type are third preference.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	$1\ N = 1\ kg.\ 1\ m/s^2$
Energy	joule	J	$1\ J = 1\ N.m$
Power	watt	W	$1\ W = 1\ J/s$
Flux	weber	Wb	$1\ Wb = 1\ V.s$
Flux density	tesla	T	$1\ T = 1\ Wb/m^2$
Frequency	hertz	Hz	$1\ Hz = 1\ c/s\ (s^{-1})$
Electric conductance	siemens	S	$1\ S = 1\ A/V$
Pressure, stress	pascal	Pa	$1\ Pa = 1\ N/m^2$

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